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ABSTRACT

A description is given of a Summer Critical Skills Institute program developed under the aegis of a number of private corporations in conjunction with several educational agencies. This program provides opportunities for teachers to learn how to foster students' problem solving abilities. The teachers, working directly with young learners and supervised by master teachers, are introduced to an approach called "Learning by Real Problems." Learners are confronted with problems of complexity sufficient to demand high order thinking skills, yet realistic in terms of the situation and the maturity of the learners. Because this learning model functions within the work setting of the sponsoring corporations, it represents an approach to school learning that the corporations are ready to support. (JD)

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AN EVALUATION OF A PRIVATE SECTOR INITIATIVE TO SUPPORT PUBLIC EDUCATION

by

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Presented at the 32nd World Assembly

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ABSTRACT

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An Evaluation of the Effectiveness of a Joint Effort by Private Corporations and Public Education Agencies

Four years ago a number of corporations located in the State of New Hampshire, in collaboration with several educational agencies, formed the Corporate Council for Critical Skills. Major funding is provided by the participating corporations. The twelve member Board of Directors includes four professional educators and eight business executives.

Under the aegis of the Corporate Council, various programs have been supported. These are characterized by two major thrusts. One has been the development and promotion of incentives to attract and retain good public school teachers of science, mathematics, and computer usage.

Arrangements have included part-time or summer employment by participating corporations, provisions to allow corporation specialists to carry a limited teaching load in a local school, and sponsorship of field trips or message tours to augment the schools' instructional programs in mathematics, science, and computers.

A second activity has been the establishment of staff development opportunities for teachers and creation of exemplary programs designed to foster the student's problem-solving abilities.

The centerpiece has been a series of Summer Critical Skills Institutes, conducted by master teachers and attended by classroom teachers. At these institutes the classroom teachers, working directly with young learners and supervised by master teachers, are introduced to an approach called "Learning by Real Problems." Learners are confronted with problems of complexity sufficient to demand high order thinking skills, yet realistic in terms of the situation and the maturity of the learners. The learner's task is to solve the problem. The teacher's task is to help the learner gain increasingly sophisticated critical thinking skills, and to extend subject matter knowledge through this experiential learning exercise. Because this is the learning model functioning within the work setting of the sponsoring corporations, it represents an approach to school learning that the corporations are ready to support.

Sufficient evaluative information is becoming available to allow an assessment of the effectiveness of these efforts. Data regarding teacher retention, professional development of teachers, student learnings in basic skills, and student motivation when exposed to the "Learning by Real Problems" methodology serve to document effectiveness of the programs.

(A formal evaluation of the impact of the Summer Critical Skills Institutes is now being done under the direction of the author. Results of this evaluation will be presented as part of this paper.)

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AN EVALUATION OF A PRIVATE SECTOR INITIATIVE TO SUPPORT PUBLIC EDUCATION

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Introduction

In recent years numerous reports have probed a variety of problems faced by public education in the United States. Reports sponsored at the federal level have called for an array of new initiatives. Consistent with the present administration's confidence that the private sector is a promising vehicle for solving many public problems, there have been strong recommendations that business organizations provide direct support to public education. These appeals have not gone unheeded.

In May 1984, the Secretary of Education, T. H. Bell, issued his monograph, The Nation Responds, describing recent efforts to improve education. Presumably these efforts were prompted by the report of the National Commission on Excellence in Education (A Nation at Risk) issued one year earlier. Bell's monograph devotes 19 pages to brief descriptions of 33 exemplars of school-business partnerships.

Nature and Mission of the Corporate Council for Critical Skills

One of the entries describes New Hampshire's Corporate Council for Critical Skills. The Corporate Council was incorporated in July 1981 as an effort by a group of New Hampshire corporations to assist

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educators in dealing with several problems related to a growing shortage of qualified teachers and a need to improve the teaching of critical skills.

The Council's 12-person Board of Directors includes nine officials of participating corporations and three representatives of educational units. Financial support is provided by over 50 corporations, foundations, and individuals. For 1984 the income received to support Council activities was approximately $115,000.

Projects supported by the Council have spanned a wide range of possibilities, including supplemental employment of teachers by corporations, message tours of plants, and various public information initiatives.

However, the center piece of the Council's efforts has been the Critical Skills Institutes designed to offer special summer training and stimulation to experienced teachers. Far and away, this has been the major commitment of the Council and it is this set of activities that will be addressed in this paper.

The Critical Skills

From its inception the Council chose to emphasize the development of "critical skills." These are viewed as generic skills best learned by dealing with real problems that are not grounded in any single academic discipline.

In its most recent formulation, the Council's listing of critical skills is as follows:

Problem Solving Skills

1. Defines the problem before solving.
2. Asks the right questions.
3. Gathers a wide range of information.
4. Utilizes information and skills from previous experiences.
5. Analyzes/weighs information gathered.
6. Uses relevant information and concepts to solve problems.
7. Considers more than one solution.
8. Solves problems based on its definition.
9. Tests possible solutions to the problem.

Communication Skills

1. Communicates well orally to groups and one-to-one.
2. Communicates well in writing: clear, concise, organized.
3. Communicates well graphically: neat, clear, complete.
4. Effectively participates in meetings.

Decision Making Skills

1. Is able to make decisions on important or relevant issues.
2. Is willing and able to compromise at appropriate times.
3. Uses consensus of ideas for group decision-making.
4. Is able to provide rationale for decisions.
5. Is aware of consequences of decisions.

Organization Skills

1. Budgets time well.
2. Organizes information gathered.
3. Effectively creates and utilizes a working area.
4. Prepares and plans effectively.

Management Skills

1. Keeps informed of group and overall progress.
2. Negotiates solutions to problems within/between the group(s).
3. Provides constructive leadership for group or overall structure.

Independent Learning Skills

1. Is aware of and utilizes appropriate sources.
2. Concentrates and perseveres on given tasks.
3. Takes initiative in assigning self additional tasks.

Documentation Skills

1. Takes and keeps notes from small and large group meetings.
2. Keeps and files copies of important documents.
3. Compiles daily agendas for following day's work.

Cooperation Skills

1. Demonstrates a willingness to work with others.
2. Seeks out a fair share of the workload.
3. Abides by group decisions.
4. Abides by designated rules and regulations.
5. Uses tact and diplomacy to solicit information or make requests.

The Critical Skills Institutes

Each summer the Council has sponsored or supported two or three Critical Skills Institutes of five to six weeks duration. Each Institute enrolls approximately 15 teachers. The format includes a one-week orientation of the teachers to acquaint them with the "Learning by Real Problems" approach (LBRP). Then a demonstration school is organized. Students from grades five to ten comprise the student body of this four or five week experience. The teachers, supported by master teachers, develop their own skill at a form of non-directive, problem-centered instruction designed to place maximum responsibility on the learner to identify and use the critical skills needed to solve the problem that has been presented.

What sort of problems? In one case, the learners were given the task of designing an arrangement to permit two mice to remain submerged for a period of 24 hours without harm. They succeeded in this exercise, but only after considerable independent reading and uncounted discussions with biologists, engineers, and other experts.

A second example illustrates the diversity that is possible--and desired. An institute held in a small rural community charged a group of young learners with identifying the persons buried under unmarked

headstones in a tiny, overgrown burial plot. This had long been a local mystery. With limited but sensitive guidance, the young learners soon were combing through ancient town records, examining family geneologies, interviewing elderly citizens, tracing the records of ownership of that parcel of land, and more. In this case, the problem was not solved. But the learning was clearly a success and the cemetery plot was cleaned up and restored to attractive appearance.

To learn just what impact all of this has on the students and the teachers, several follow-up studies have been conducted.

Parent Evaluation of Impact on Students

Following the three institutes conducted in 1984, parents of the children attending were asked to complete a questionnaire that asked about changes the parents noted in their children.

The changes most frequently reported tended to involve motivation, attitude, and what might be called "process skills." For example, 75% of the parents reported an increase in their child's problem-solving skills, 66% reported an increase in decision-making skills, and slightly over 50% reported increases in responsibility for task completion, skill in working with other people, organizational and management skills, and documentation skills.

On the other hand, about one third or less of the respondents reported improvement in academic areas, computer skills, or skill at written communication. More on this matter later.

Individual comments reflect this same pattern. One parent wrote, "He now participates more actively in school without excessive self-

consciousness." Another said, "I learned to have more faith in the children's ability to deal with average work day problems. The children enjoy the challenge of facing real problems." A third wrote, "He is now very able to call a complete stranger on the telephone and carry on a very adult conversation without hesitation and with confidence and ease. He has learned to plan the basic parts of the conversation ahead of time."

Perhaps the best overall evaluation from the parents is summed up by the fact that 95% of all respondents said they would send their child to a similar program in the future.

Teacher Evaluation of Critical Skills Institutes

In April 1985 all teachers who had participated in any of the six prior critical skills institutes were surveyed. Despite a vigorous "second request," of 69 teachers contacted, 23 returned the survey instrument. One can only speculate on the significance of that, but it seems probable that the most enthusiastic teachers were the ones who responded. At any rate, the results should be viewed in the context of the relatively low return rate.

Respondents overwhelmingly were teachers of mathematics and science, 19 teaching in one or both of these fields.

Results of the survey are summarized below.

SURVEY OF TEACHERS WHO ATTENDED A CRITICAL SKILLS INSTITUTE
1982-1984

I. PRESENT INSTRUCTONAL EMPHASIS

Percent of Class Time Spent	Instruction in Critical Skills	Use of LBRP Process
0%	0	1
20%	5	10
40%	6	5
60%	3	2
80%	7	3
100%	1	0

Comment: About half of the teachers report using more than half of class time on instruction in critical skills, but substantially fewer teachers devote this share of class time to use of LBRP process.

II. IMPORTANCE OF INSTITUTE TO TEACHER

Importance for Teaching of	Essential 1	2	3	4	Not Needed 5	No Reply X
Critical Skills	8	9	3	1	0	2
LBRP Process	10	8	1	2	0	2

Comment: Teachers considered experiences at the institute to be essential or extremely helpful in preparing them to teach critical skills or use the LBRP process.

III. IMPORTANCE OF CRITICAL SKILLS IN SCHOOL CURRICULUM

	For All	For Most	For Some	For Few	For None
Students	11	11	0	0	0
Subjects	9	10	3	0	0

Comment: Teachers viewed critical skills instruction as a virtual universal imperative, an objective appropriate for most students and most subjects.

IV. COMPARISON OF STUDENT PERFORMANCE BEFORE AND AFTER TEACHER PARTICIPATION AT AN INSTITUTE

Student Performance	Subject Matter Mastery	Use of Critical Skills
Significant Increase	2	8
Some Increase	5	12
Same	12	2
Less	2	0

Comment: After participation at an institute, teachers note a definite increase in students' use of critical skills. However, increases in mastery of subject matter are less frequent and, in a minority of cases, mastery of subject matter seems to be lower.

V. VALUE OF VARIOUS COUNCIL PROGRAMS

	Essential	Important	Helpful	Not Needed	No Reply
Critical Skills Institutes	9	11	2	0	1
Summer Jobs for Teachers	8	5	3	2	5
Message Tours	1	3	5	3	11
Field Support after Institutes	7	6	3	2	5
Council Advocacy of Reform	5	10	4	2	2

Comment: Teachers placed highest value on the summer institutes, least value on the message tours. Other Council projects were judged to have considerable importance by more than half the teachers responding.

VI. IMPORTANCE OF COUNCIL PROGRAMS TO TEACHER'S DECISION TO REMAIN IN THE PROFESSION

	Great Importance 1	2	3	4	Not a Factor 5
No. of Teachers	3	9	4	0	7

Comment: For about 10% of the teachers the Council's programs are seen as crucial to a decision to remain in the profession. And over half of the respondents found the Council programs to be of considerable importance in such a decision. About one third of the teachers report that these programs played no part in their decision to continue teaching.

Many teachers offered additional comments to supplement the specific items on the survey instrument. These are consistent with the summary just presented, but add a certain unique flavor to the evaluation.

Middle School Science Teacher: "Students feel a greater sense of accomplishment knowing they have done a problem on their own."

High School Science Teacher: "Although I don't devote much class time to LBRP per se, the summer institute has been invaluable. I am aware of the kinds of learning that can take place given the proper setting. I am always in hopes that the situation will arise when I can implement it 100%. Until that time I squeeze in what I can where I can."

Fifth Grade Teacher: "When I started LBRP it was almost a miracle. They started working."

Independent Observations

In 1984 a college faculty member (not the author) spent a summer as an observer-consultant with one institute. In his report he wrote, "The concept of student responsibility for learning and social governance has been demonstrated in a most constructive fashion in this institute." He closed his report by commenting, "This has been the most exciting institute I have seen in 24 years of education. The potential for the future is as real as the successes of the past four weeks."

Often visitors spend a day observing at an institute. Each is asked to complete a reaction sheet at the close of the visit.

Representative quotes taken at random from 44 reaction sheets again capture the flavor of the institutes as visitors comment on what impressed them most.

> "the ability of the pupils to seek and gracefully accept constructive criticism"
>
> "teacher enthusiasm (for a new approach)"
>
> "the dedication, enthusiasm, and mature mental processes of the kids"
>
> "the independence and enthusiasm of the children"

Relationship to Learning Academic Content

All of these accolades, however, leave one important consideration untouched.

Ultimately schools must accomplish the task of helping learners organize knowledge in some systematic, coherent form. Usually these forms are called "subject matter" or "academic disciplines." Thus, there is a gap between LBRP with its "as needed" approach to traditional subject matter and the eventual need for the learner to comprehend subject matter as an organized intellectual entity.

This is not a new problem. Nearly 50 years ago John Dewey discussed this problem in his Experience and Education. Dewey wrote:

> One consideration stands out clearly when education is conceived in terms of experience. Anything which can be called a study, whether arithmetic, history, geography, or one of the natural sciences, must be derived from materials which at the outset fall within the scope of ordinary life experience.... But finding the material for learning within experience is only the first step. The next step is the progressive development of what is already experienced into a fuller and richer and also more organized form, a form that gradually approximates that in which subject matter is presented to a skilled, mature person. (Experience and Education, pp. 86-87)

How well has the Critical Skills Institute program responded to this challenge? At this writing we have limited data from one middle school which undertook a reasonably controlled study of the matter based on the 1983-84 school year performance.

For this study, a three-person teaching team taught classes of sixth and seventh graders using the LBRP approach. Another teaching team taught a comparable group of sixth and seventh graders in the same school using the traditional curriculum and instructional methodology. The two groups were matched on the basis of scores on the Otis-Lennon School Ability Index as follows.

		Mean IQ	Range
Critical Skills Program	Gr. 6	120	102-132
	Gr. 7	124	112-137
Traditional Program	Gr. 6	119	111-126
	Gr. 7	123	118-138

End of the year scores on the Stanford Achievement Test were compared using the average National Percentile Ranking and stanine scores for each group and each grade level. For the sixth graders comparisons were made for 12 sub-tests and four total scores (Listening, Reading, Language, and Mathematics) as well as a score for the complete battery. For the seventh graders, one sub-test and the total score for Reading were not reported.

When the groups were compared on a sub-score by sub-score basis, differences are very slight. However, as the following table illustrates, the differences systematically favor the "critical skills group" in almost all areas.

COMPARISON OF STANFORD ACHIEVEMENT SCORES, 1983-1984

Test	Average Score of Critical Skills Classes		Average Score of Traditional Classes	
	Gr. 6	Gr. 7	Gr. 6	Gr. 7
Reading Comp.	Higher	Higher		
Vocabulary	Higher	Higher		
Listening	Higher	Higher		
Spelling	Higher	Higher		
Language	Higher	Higher		
Concept of Numbers		Higher	Higher	
Math Computation		Higher	Higher	
Math Application	Higher	Higher		
Social Science	Higher	Higher		
Science	Higher	Higher		
Using Information	Higher	Higher		
Word Study Skills	Higher	N/A		N/A
Total Listening	Higher	Higher		
Total Language	Higher	Higher		
Total Math			Higher	
Total Reading	Higher	N/A		N/A
Complete Battery	Higher	Higher		

A cautious interpretation of the foregoing data suggests that students taught by the LBRP do not lag behind in their mastery of academic content. The fact that the sixth grade traditional group did better on the mathematics tests is a little ironic because the Council has been especially concerned about mathematics and science learnings. Again, let it be noted that differences were very small and the mathematics results are reversed for the seventh grade groups.

It should be observed, however, that this school serves students drawn largely from middle and upper socio-economic levels, and the students test well above national averages with respect to both intellectual ability and school performance. It is by no means certain that similar results would be obtained with less favored students.

Summary

The Corporate Council for Critical Skills has placed greatest emphasis on summer institutes for experienced teachers. At these institutes teachers are aided in improving their ability to teach a set of generalized critical skills using an experience-based instructional technique.

Implementation in schools during the regular school year has been incomplete, but not disappointing. Subjective reports from parents, teachers and independent observers indicate a highly positive response to this program. Data concerning the impact on student performance in conventional academic subjects is limited but suggests that emphasis on critical skills and experiential learning does not reduce the level of academic achievement.

Corporate sponsorship of this program places major emphasis on teachers and on the in-service growth of experienced teachers as the most promising approach. Rather than treating the question of educational reform as a matter of materials, equipment, or curriculum revision, the Council has directed its resources at changing the attitudes, skills, and purposes of teachers in order to place greater attention on the development of self-directed and resourceful citizens.